

## SEQUENCE LISTING

<110> Wilson, James M.  
Xiao, Weidong

<120> Adeno-Associated Virus Serotype I Nucleic Acid Sequences,  
Vectors and Host Cells Containing Same

<130> GNVPN.031USA

<140> US 09/807,802

<141> 2001-04-17

<150> US 60/107,114

<151> 1998-11-05

<150> PCT/US99/25694

<151> 1999-11-02

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<170> PatentIn version 3.1

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Thr	Gln	Pro	Glu	Leu	Gln	Trp	Ala	Trp	Thr	Asn	Met	Glu	Glu	Tyr	Ile
				165					170					175	
Ser	Ala	Cys	Leu	Asn	Leu	Ala	Glu	Arg	Lys	Arg	Leu	Val	Ala	Gln	His
			180					185					190		
Leu	Thr	His	Val	Ser	Gln	Thr	Gln	Glu	Gln	Asn	Lys	Glu	Asn	Leu	Asn
		195					200					205			
Pro	Asn	Ser	Asp	Ala	Pro	Val	Ile	Arg	Ser	Lys	Thr	Ser	Ala	Arg	Tyr
						215					220				
Met	Glu	Leu	Val	Gly	Trp	Leu	Val	Asp	Arg	Gly	Ile	Thr	Ser	Glu	Lys
225					230					235					240
Gln	Trp	Ile	Gln	Glu	Asp	Gln	Ala	Ser	Tyr	Ile	Ser	Phe	Asn	Ala	Ala
				245					250					255	
Ser	Asn	Ser	Arg	Ser	Gln	Ile	Lys	Ala	Ala	Leu	Asp	Asn	Ala	Gly	Lys
			260					265					270		
Ile	Met	Ala	Leu	Thr	Lys	Ser	Ala	Pro	Asp	Tyr	Leu	Val	Gly	Pro	Ala
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Pro	Pro	Ala	Asp	Ile	Lys	Thr	Asn	Arg	Ile	Tyr	Arg	Ile	Leu	Glu	Leu
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Asn	Gly	Tyr	Glu	Pro	Ala	Tyr	Ala	Gly	Ser	Val	Phe	Leu	Gly	Trp	Ala
305					310					315					320
Gln	Lys	Arg	Phe	Gly	Lys	Arg	Asn	Thr	Ile	Trp	Leu	Phe	Gly	Pro	Ala
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 Phe Tyr Gly Cys Val Asn Trp Thr Asn Glu Asn Phe Pro Phe Asn Asp  
 355 360 365  
 Cys Val Asp Lys Met Val Ile Trp Trp Glu Glu Gly Lys Met Thr Ala  
 370 375 380  
 Lys Val Val Glu Ser Ala Lys Ala Ile Leu Gly Gly Ser Lys Val Arg  
 385 390 395 400  
 Val Asp Gln Lys Cys Lys Ser Ser Ala Gln Ile Asp Pro Thr Pro Val  
 405 410 415  
 Ile Val Thr Ser Asn Thr Asn Met Cys Ala Val Ile Asp Gly Asn Ser  
 420 425 430  
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 Glu Leu Thr Arg Arg Leu Glu His Asp Phe Gly Lys Val Thr Lys Gln  
 450 455 460  
 Glu Val Lys Glu Phe Phe Arg Trp Ala Gln Asp His Val Thr Glu Val  
 465 470 475 480  
 Ala His Glu Phe Tyr Val Arg Lys Gly Gly Ala Asn Lys Arg Pro Ala  
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 Pro Asp Asp Ala Asp Lys Ser Glu Pro Lys Arg Ala Cys Pro Ser Val  
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 Cys Phe Thr His Gly Thr Arg Asp Cys Ser Glu Cys Phe Pro Gly Val  
 565 570 575  
 Ser Glu Ser Gln Pro Val Val Arg Lys Arg Thr Tyr Arg Lys Leu Cys  
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Lys	Ala	Asn	Gln	Gln	Lys	Gln	Asp	Asp	Gly	Arg	Gly	Leu	Val	Leu	Pro
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Gly	Tyr	Lys	Tyr	Leu	Gly	Pro	Phe	Asn	Gly	Leu	Asp	Lys	Gly	Glu	Pro
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Val	Asn	Ala	Ala	Asp	Ala	Ala	Ala	Leu	Glu	His	Asp	Lys	Ala	Tyr	Asp
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Gln	Gln	Leu	Lys	Ala	Gly	Asp	Asn	Pro	Tyr	Leu	Arg	Tyr	Asn	His	Ala
				85					90					95	
Asp	Ala	Glu	Phe	Gln	Glu	Arg	Leu	Gln	Glu	Asp	Thr	Ser	Phe	Gly	Gly
			100					105					110		
Asn	Leu	Gly	Arg	Ala	Val	Phe	Gln	Ala	Lys	Lys	Arg	Val	Leu	Glu	Pro
		115					120					125			
Leu	Gly	Leu	Val	Glu	Glu	Gly	Ala	Lys	Thr	Ala	Pro	Gly	Lys	Lys	Arg
	130					135					140				
Pro	Val	Glu	Gln	Ser	Pro	Gln	Glu	Pro	Asp	Ser	Ser	Ser	Gly	Ile	Gly
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Lys	Thr	Gly	Gln	Gln	Pro	Ala	Lys	Lys	Arg	Leu	Asn	Phe	Gly	Gln	Thr
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Gly	Asp	Ser	Glu	Ser	Val	Pro	Asp	Pro	Gln	Pro	Leu	Gly	Glu	Pro	Pro
			180					185					190		
Ala	Thr	Pro	Ala	Ala	Val	Gly	Pro	Thr	Thr	Met	Ala	Ser	Gly	Gly	Gly
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Ala	Pro	Met	Ala	Asp	Asn	Asn	Glu	Gly	Ala	Asp	Gly	Val	Gly	Asn	Ala
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Ser	Gly	Asn	Trp	His	Cys	Asp	Ser	Thr	Trp	Leu	Gly	Asp	Arg	Val	Ile
225					230					235					240
Thr	Thr	Ser	Thr	Arg	Thr	Trp	Ala	Leu	Pro	Thr	Tyr	Asn	Asn	His	Leu
				245					250					255	
Tyr	Lys	Gln	Ile	Ser	Ser	Ala	Ser	Thr	Gly	Ala	Ser	Asn	Asp	Asn	His
			260					265					270		
Tyr	Phe	Gly	Tyr	Ser	Thr	Pro	Trp	Gly	Tyr	Phe	Asp	Phe	Asn	Arg	Phe
		275					280					285			
His	Cys	His	Phe	Ser	Pro	Arg	Asp	Trp	Gln	Arg	Leu	Ile	Asn	Asn	Asn
	290					295					300				
Trp	Gly	Phe	Arg	Pro	Lys	Arg	Leu	Asn	Phe	Lys	Leu	Phe	Asn	Ile	Gln



625		630		635		640
Lys Asn Pro Pro Pro Gln Ile Leu Ile Lys Asn Thr Pro Val Pro Ala						
		645		650		655
Asn Pro Pro Ala Glu Phe Ser Ala Thr Lys Phe Ala Ser Phe Ile Thr						
		660		665		670
Gln Tyr Ser Thr Gly Gln Val Ser Val Glu Ile Glu Trp Glu Leu Gln						
		675		680		685
Lys Glu Asn Ser Lys Arg Trp Asn Pro Glu Val Gln Tyr Thr Ser Asn						
		690		695		700
Tyr Ala Lys Ser Ala Asn Val Asp Phe Thr Val Asp Asn Asn Gly Leu						
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Tyr Thr Glu Pro Arg Pro Ile Gly Thr Arg Tyr Leu Thr Arg Pro Leu						
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Glu His Leu Pro Gly Ile Ser Asp Ser Phe Val Ser Trp Val Ala Glu	
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Lys Glu Trp Glu Leu Pro Pro Asp Ser Asp Met Asp Leu Asn Leu Ile	
35 40 45	
gag cag gca ccc ctg acc gtg gcc gag aag ctg cag cgc gac ttc ctg	192
Glu Gln Ala Pro Leu Thr Val Ala Glu Lys Leu Gln Arg Asp Phe Leu	
50 55 60	
gtc caa tgg cgc cgc gtg agt aag gcc ccg gag gcc ctc ttc ttt gtt	240
Val Gln Trp Arg Arg Val Ser Lys Ala Pro Glu Ala Leu Phe Phe Val	
65 70 75 80	
cag ttc gag aag ggc gag tcc tac ttc cac ctc cat att ctg gtg gag	288
Gln Phe Glu Lys Gly Glu Ser Tyr Phe His Leu His Ile Leu Val Glu	
85 90 95	
acc acg ggg gtc aaa tcc atg gtg ctg ggc cgc ttc ctg agt cag att	336
Thr Thr Gly Val Lys Ser Met Val Leu Gly Arg Phe Leu Ser Gln Ile	
100 105 110	

agg gac aag ctg gtg cag acc atc tac cgc ggg atc gag ccg acc ctg	384
Arg Asp Lys Leu Val Gln Thr Ile Tyr Arg Gly Ile Glu Pro Thr Leu	
115 120 125	
ccc aac tgg ttc gcg gtg acc aag acg cgt aat ggc gcc gga ggg ggg	432
Pro Asn Trp Phe Ala Val Thr Lys Thr Arg Asn Gly Ala Gly Gly Gly	
130 135 140	
aac aag gtg gtg gac gag tgc tac atc ccc aac tac ctc ctg ccc aag	480
Asn Lys Val Val Asp Glu Cys Tyr Ile Pro Asn Tyr Leu Leu Pro Lys	
145 150 155 160	
act cag ccc gag ctg cag tgg gcg tgg act aac atg gag gag tat ata	528
Thr Gln Pro Glu Leu Gln Trp Ala Trp Thr Asn Met Glu Glu Tyr Ile	
165 170 175	
agc gcc tgt ttg aac ctg gcc gag cgc aaa cgg ctc gtg gcg cag cac	576
Ser Ala Cys Leu Asn Leu Ala Glu Arg Lys Arg Leu Val Ala Gln His	
180 185 190	
ctg acc cac gtc agc cag acc cag gag cag aac aag gag aat ctg aac	624
Leu Thr His Val Ser Gln Thr Gln Glu Gln Asn Lys Glu Asn Leu Asn	
195 200 205	
ccc aat tct gac gcg cct gtc atc cgg tca aaa acc tcc gcg cgc tac	672
Pro Asn Ser Asp Ala Pro Val Ile Arg Ser Lys Thr Ser Ala Arg Tyr	
210 215 220	
atg gag ctg gtc ggg tgg ctg gtg gac cgg ggc atc acc tcc gag aag	720
Met Glu Leu Val Gly Trp Leu Val Asp Arg Gly Ile Thr Ser Glu Lys	
225 230 235 240	
cag tgg atc cag gag gac cag gcc tcg tac atc tcc ttc aac gcc gct	768
Gln Trp Ile Gln Glu Asp Gln Ala Ser Tyr Ile Ser Phe Asn Ala Ala	
245 250 255	
tcc aac tcg cgg tcc cag atc aag gcc gct ctg gac aat gcc ggc aag	816
Ser Asn Ser Arg Ser Gln Ile Lys Ala Ala Leu Asp Asn Ala Gly Lys	
260 265 270	
atc atg gcg ctg acc aaa tcc gcg ccc gac tac ctg gta ggc ccc gct	864
Ile Met Ala Leu Thr Lys Ser Ala Pro Asp Tyr Leu Val Gly Pro Ala	
275 280 285	
ccg ccc gcg gac att aaa acc aac cgc atc tac cgc atc ctg gag ctg	912
Pro Pro Ala Asp Ile Lys Thr Asn Arg Ile Tyr Arg Ile Leu Glu Leu	
290 295 300	
aac ggc tac gaa cct gcc tac gcc ggc tcc gtc ttt ctc ggc tgg gcc	960
Asn Gly Tyr Glu Pro Ala Tyr Ala Gly Ser Val Phe Leu Gly Trp Ala	
305 310 315 320	
cag aaa agg ttc ggg aag cgc aac acc atc tgg ctg ttt ggg ccg gcc	1008
Gln Lys Arg Phe Gly Lys Arg Asn Thr Ile Trp Leu Phe Gly Pro Ala	
325 330 335	
acc acg ggc aag acc aac atc gcg gaa gcc atc gcc cac gcc gtg ccc	1056
Thr Thr Gly Lys Thr Asn Ile Ala Glu Ala Ile Ala His Ala Val Pro	
340 345 350	

ttc tac ggc tgc gtc aac tgg acc aat gag aac ttt ccc ttc aat gat	1104
Phe Tyr Gly Cys Val Asn Trp Thr Asn Glu Asn Phe Pro Phe Asn Asp	
355 360 365	
tgc gtc gac aag atg gtg atc tgg tgg gag gag ggc aag atg acg gcc	1152
Cys Val Asp Lys Met Val Ile Trp Trp Glu Glu Gly Lys Met Thr Ala	
370 375 380	
aag gtc gtg gag tcc gcc aag gcc att ctc ggc ggc agc aag gtg cgc	1200
Lys Val Val Glu Ser Ala Lys Ala Ile Leu Gly Gly Ser Lys Val Arg	
385 390 395 400	
gtg gac caa aag tgc aag tcg tcc gcc cag atc gac ccc acc ccc gtg	1248
Val Asp Gln Lys Cys Lys Ser Ser Ala Gln Ile Asp Pro Thr Pro Val	
405 410 415	
atc gtc acc tcc aac acc aac atg tgc gcc gtg att gac ggg aac agc	1296
Ile Val Thr Ser Asn Thr Asn Met Cys Ala Val Ile Asp Gly Asn Ser	
420 425 430	
acc acc ttc gag cac cag cag ccg ttg cag gac cgg atg ttc aaa ttt	1344
Thr Thr Phe Glu His Gln Gln Pro Leu Gln Asp Arg Met Phe Lys Phe	
435 440 445	
gaa ctc acc cgc cgt ctg gag cat gac ttt ggc aag gtg aca aag cag	1392
Glu Leu Thr Arg Arg Leu Glu His Asp Phe Gly Lys Val Thr Lys Gln	
450 455 460	
gaa gtc aaa gag ttc ttc cgc tgg gcg cag gat cac gtg acc gag gtg	1440
Glu Val Lys Glu Phe Phe Arg Trp Ala Gln Asp His Val Thr Glu Val	
465 470 475 480	
gcg cat gag ttc tac gtc aga aag ggt gga gcc aac aaa aga ccc gcc	1488
Ala His Glu Phe Tyr Val Arg Lys Gly Gly Ala Asn Lys Arg Pro Ala	
485 490 495	
ccc gat gac gcg gat aaa agc gag ccc aag cgg gcc tgc ccc tca gtc	1536
Pro Asp Asp Ala Asp Lys Ser Glu Pro Lys Arg Ala Cys Pro Ser Val	
500 505 510	
gcg gat cca tcg acg tca gac gcg gaa gga gct ccg gtg gac ttt gcc	1584
Ala Asp Pro Ser Thr Ser Asp Ala Glu Gly Ala Pro Val Asp Phe Ala	
515 520 525	
gac agg tac caa aac aaa tgt tct cgt cac gcg ggc atg ctt cag atg	1632
Asp Arg Tyr Gln Asn Lys Cys Ser Arg His Ala Gly Met Leu Gln Met	
530 535 540	
ctg ttt ccc tgc aag aca tgc gag aga atg aat cag aat ttc aac att	1680
Leu Phe Pro Cys Lys Thr Cys Glu Arg Met Asn Gln Asn Phe Asn Ile	
545 550 555 560	
tgc ttc acg cac ggg acg aga gac tgt tca gag tgc ttc ccc ggc gtg	1728
Cys Phe Thr His Gly Thr Arg Asp Cys Ser Glu Cys Phe Pro Gly Val	
565 570 575	
tca gaa tct caa ccg gtc gtc aga aag agg acg tat cgg aaa ctc tgt	1776
Ser Glu Ser Gln Pro Val Val Arg Lys Arg Thr Tyr Arg Lys Leu Cys	
580 585 590	

gcc att cat cat ctg ctg ggg cgg gct ccc gag att gct tgc tcg gcc 1824  
 Ala Ile His His Leu Leu Gly Arg Ala Pro Glu Ile Ala Cys Ser Ala  
                   595                                  600                                  605

tgc gat ctg gtc aac gtg gac ctg gat gac tgt gtt tct gag caa taa 1872  
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Lys Glu Trp Glu Leu Pro Pro Asp Ser Asp Met Asp Leu Asn Leu Ile  
                   35                                  40                                  45

Glu Gln Ala Pro Leu Thr Val Ala Glu Lys Leu Gln Arg Asp Phe Leu  
           50                                  55                                  60

Val Gln Trp Arg Arg Val Ser Lys Ala Pro Glu Ala Leu Phe Phe Val  
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Gln Phe Glu Lys Gly Glu Ser Tyr Phe His Leu His Ile Leu Val Glu  
                   85                                  90                                  95

Thr Thr Gly Val Lys Ser Met Val Leu Gly Arg Phe Leu Ser Gln Ile  
                   100                                  105                                  110

Arg Asp Lys Leu Val Gln Thr Ile Tyr Arg Gly Ile Glu Pro Thr Leu  
           115                                  120                                  125

Pro Asn Trp Phe Ala Val Thr Lys Thr Arg Asn Gly Ala Gly Gly Gly  
           130                                  135                                  140

Asn Lys Val Val Asp Glu Cys Tyr Ile Pro Asn Tyr Leu Leu Pro Lys  
 145                                  150                                  155                                  160

Thr Gln Pro Glu Leu Gln Trp Ala Trp Thr Asn Met Glu Glu Tyr Ile  
                   165                                  170                                  175

Ser Ala Cys Leu Asn Leu Ala Glu Arg Lys Arg Leu Val Ala Gln His  
                   180                                  185                                  190

Leu Thr His Val Ser Gln Thr Gln Glu Gln Asn Lys Glu Asn Leu Asn  
                   195                                  200                                  205

Pro Asn Ser Asp Ala Pro Val Ile Arg Ser Lys Thr Ser Ala Arg Tyr  
           210                                  215                                  220

Met Glu Leu Val Gly Trp Leu Val Asp Arg Gly Ile Thr Ser Glu Lys  
 225                                  230                                  235                                  240



00007802 112901

Gln	Trp	Ile	Gln	Glu	Asp	Gln	Ala	Ser	Tyr	Ile	Ser	Phe	Asn	Ala	Ala	
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Ile	Met	Ala	Leu	Thr	Lys	Ser	Ala	Pro	Asp	Tyr	Leu	Val	Gly	Pro	Ala	
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Pro	Pro	Ala	Asp	Ile	Lys	Thr	Asn	Arg	Ile	Tyr	Arg	Ile	Leu	Glu	Leu	
	290					295					300					
Asn	Gly	Tyr	Glu	Pro	Ala	Tyr	Ala	Gly	Ser	Val	Phe	Leu	Gly	Trp	Ala	
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Gln	Lys	Arg	Phe	Gly	Lys	Arg	Asn	Thr	Ile	Trp	Leu	Phe	Gly	Pro	Ala	
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Thr	Thr	Gly	Lys	Thr	Asn	Ile	Ala	Glu	Ala	Ile	Ala	His	Ala	Val	Pro	
			340					345					350			
Phe	Tyr	Gly	Cys	Val	Asn	Trp	Thr	Asn	Glu	Asn	Phe	Pro	Phe	Asn	Asp	
		355					360					365				
Cys	Val	Asp	Lys	Met	Val	Ile	Trp	Trp	Glu	Glu	Gly	Lys	Met	Thr	Ala	
		370				375					380					
Lys	Val	Val	Glu	Ser	Ala	Lys	Ala	Ile	Leu	Gly	Gly	Ser	Lys	Val	Arg	
385					390					395					400	
Val	Asp	Gln	Lys	Cys	Lys	Ser	Ser	Ala	Gln	Ile	Asp	Pro	Thr	Pro	Val	
				405					410					415		
Ile	Val	Thr	Ser	Asn	Thr	Asn	Met	Cys	Ala	Val	Ile	Asp	Gly	Asn	Ser	
			420				425						430			
Thr	Thr	Phe	Glu	His	Gln	Gln	Pro	Leu	Gln	Asp	Arg	Met	Phe	Lys	Phe	
		435					440					445				
Glu	Leu	Thr	Arg	Arg	Leu	Glu	His	Asp	Phe	Gly	Lys	Val	Thr	Lys	Gln	
		450				455					460					
Glu	Val	Lys	Glu	Phe	Phe	Arg	Trp	Ala	Gln	Asp	His	Val	Thr	Glu	Val	
465					470					475					480	
Ala	His	Glu	Phe	Tyr	Val	Arg	Lys	Gly	Gly	Ala	Asn	Lys	Arg	Pro	Ala	
				485					490					495		
Pro	Asp	Asp	Ala	Asp	Lys	Ser	Glu	Pro	Lys	Arg	Ala	Cys	Pro	Ser	Val	
			500				505						510			
Ala	Asp	Pro	Ser	Thr	Ser	Asp	Ala	Glu	Gly	Ala	Pro	Val	Asp	Phe	Ala	
		515					520					525				
Asp	Arg	Tyr	Gln	Asn	Lys	Cys	Ser	Arg	His	Ala	Gly	Met	Leu	Gln	Met	
	530					535					540					
Leu	Phe	Pro	Cys	Lys	Thr	Cys	Glu	Arg	Met	Asn	Gln	Asn	Phe	Asn	Ile	
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Cys Phe Thr His Gly Thr Arg Asp Cys Ser Glu Cys Phe Pro Gly Val  
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Ser Glu Ser Gln Pro Val Val Arg Lys Arg Thr Tyr Arg Lys Leu Cys  
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Ala Ile His His Leu Leu Gly Arg Ala Pro Glu Ile Ala Cys Ser Ala  
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aag gaa tgg gag ctg ccc ccg gat tct gac atg gat ctg aat ctg att 144  
 Lys Glu Trp Glu Leu Pro Pro Asp Ser Asp Met Asp Leu Asn Leu Ile  
                   35                                  40                                  45

gag cag gca ccc ctg acc gtg gcc gag aag ctg cag cgc gac ttc ctg 192  
 Glu Gln Ala Pro Leu Thr Val Ala Glu Lys Leu Gln Arg Asp Phe Leu  
                   50                                  55                                  60

gtc caa tgg cgc cgc gtg agt aag gcc ccg gag gcc ctc ttc ttt gtt 240  
 Val Gln Trp Arg Arg Val Ser Lys Ala Pro Glu Ala Leu Phe Phe Val  
 65                                  70                                  75                                  80

cag ttc gag aag ggc gag tcc tac ttc cac ctc cat att ctg gtg gag 288  
 Gln Phe Glu Lys Gly Glu Ser Tyr Phe His Leu His Ile Leu Val Glu  
                   85                                  90                                  95

acc acg ggg gtc aaa tcc atg gtg ctg ggc cgc ttc ctg agt cag att 336  
 Thr Thr Gly Val Lys Ser Met Val Leu Gly Arg Phe Leu Ser Gln Ile  
                   100                                  105                                  110

agg gac aag ctg gtg cag acc atc tac cgc ggg atc gag ccg acc ctg 384  
 Arg Asp Lys Leu Val Gln Thr Ile Tyr Arg Gly Ile Glu Pro Thr Leu  
                   115                                  120                                  125

ccc aac tgg ttc gcg gtg acc aag acg cgt aat ggc gcc gga ggg ggg 432  
 Pro Asn Trp Phe Ala Val Thr Lys Thr Arg Asn Gly Ala Gly Gly Gly  
                   130                                  135                                  140

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act Thr	cag Gln	ccc Pro	gag Glu	ctg Leu 165	cag Gln	tgg Trp	gcg Ala	tgg Trp	act Thr 170	aac Asn	atg Met	gag Glu	gag Glu	tat Tyr 175	ata Ile	528
agc Ser	gcc Ala	tgt Cys	ttg Leu 180	aac Asn	ctg Leu	gcc Ala	gag Glu	cgc Arg 185	aaa Lys	cgg Arg	ctc Leu	gtg Val	gcg Ala 190	cag Gln	cac His	576
ctg Leu	acc Thr	cac His 195	gtc Val	agc Ser	cag Gln	acc Thr	cag Gln 200	gag Glu	cag Gln	aac Asn	aag Lys	gag Glu 205	aat Asn	ctg Leu	aac Asn	624
ccc Pro	aat Asn 210	tct Ser	gac Asp	gcg Ala	cct Pro	gtc Val 215	atc Ile	cgg Arg	tca Ser	aaa Lys	acc Thr 220	tcc Ser	gcg Ala	cgc Arg	tac Tyr	672
atg Met 225	gag Glu	ctg Leu	gtc Val	ggg Gly	tgg Trp 230	ctg Leu	gtg Val	gac Asp	cgg Arg	ggc Gly 235	atc Ile	acc Thr	tcc Ser	gag Glu	aag Lys 240	720
cag Gln	tgg Trp	atc Ile	cag Gln	gag Glu	gac Asp	cag Gln	gcc Ala	tcg Ser	tac Tyr 250	atc Ile	tcc Ser	ttc Phe	aac Asn	gcc Ala 255	gct Ala	768
tcc Ser	aac Asn	tcg Ser	cgg Arg	tcc Ser	cag Gln	atc Ile	aag Lys	gcc Ala 265	gct Ala	ctg Leu	gac Asp	aat Asn	gcc Ala 270	ggc Gly	aag Lys	816
atc Ile	atg Met	gcg Ala	ctg Leu	acc Thr	aaa Lys	tcc Ser	gcg Ala	ccc Pro	gac Asp	tac Tyr	ctg Leu	gta Val 285	ggc Gly	ccc Pro	gct Ala	864
ccg Pro	ccc Pro	gcg Ala	gac Asp	att Ile	aaa Lys	acc Thr	aac Asn	cgc Arg	atc Ile	tac Tyr	cgc Arg	atc Ile	ctg Leu	gag Glu	ctg Leu	912
aac Asn 305	ggc Gly	tac Tyr	gaa Glu	cct Pro	gcc Ala 310	tac Tyr	gcc Ala	ggc Gly	tcc Ser	gtc Val 315	ttt Phe	ctc Leu	ggc Gly	tgg Trp	gcc Ala 320	960
cag Gln	aaa Lys	agg Arg	ttc Phe	ggg Gly 325	aag Lys	cgc Arg	aac Asn	acc Thr	atc Ile 330	tgg Trp	ctg Leu	ttt Phe	ggg Gly 335	ccg Pro	gcc Ala	1008
acc Thr	acg Thr	ggc Gly	aag Lys	acc Thr	aac Asn	atc Ile	gcg Ala	gaa Glu	gcc Ala	atc Ile	gcc Ala	cac His	gcc Ala 350	gtg Val	ccc Pro	1056
ttc Phe	tac Tyr	ggc Gly 355	tgc Cys	gtc Val	aac Asn	tgg Trp	acc Thr	aat Asn	gag Glu	aac Asn	ttt Phe	ccc Pro 365	ttc Phe	aat Asn	gat Asp	1104
tgc Cys 370	gtc Val	gac Asp	aag Lys	atg Met	gtg Val	atc Ile 375	tgg Trp	tgg Trp	gag Glu	gag Glu	ggc Gly 380	aag Lys	atg Met	acg Thr	gcc Ala	1152

aag gtc gtg gag tcc gcc aag gcc att ctc ggc ggc agc aag gtg cgc 1200  
Lys Val Val Glu Ser Ala Lys Ala Ile Leu Gly Gly Ser Lys Val Arg  
385 390 395 400

gtg gac caa aag tgc aag tgc tcc gcc cag atc gac ccc acc ccc gtg 1248  
Val Asp Gln Lys Cys Lys Ser Ser Ala Gln Ile Asp Pro Thr Pro Val  
405 410 415

atc gtc acc tcc aac acc aac atg tgc gcc gtg att gac ggg aac agc 1296  
Ile Val Thr Ser Asn Thr Asn Met Cys Ala Val Ile Asp Gly Asn Ser  
420 425 430

acc acc ttc gag cac cag cag ccg ttg cag gac cgg atg ttc aaa ttt 1344  
Thr Thr Phe Glu His Gln Gln Pro Leu Gln Asp Arg Met Phe Lys Phe  
435 440 445

gaa ctc acc cgc cgt ctg gag cat gac ttt ggc aag gtg aca aag cag 1392  
Glu Leu Thr Arg Arg Leu Glu His Asp Phe Gly Lys Val Thr Lys Gln  
450 455 460

gaa gtc aaa gag ttc ttc cgc tgg gcg cag gat cac gtg acc gag gtg 1440  
Glu Val Lys Glu Phe Phe Arg Trp Ala Gln Asp His Val Thr Glu Val  
465 470 475 480

gcg cat gag ttc tac gtc aga aag ggt gga gcc aac aaa aga ccc gcc 1488  
Ala His Glu Phe Tyr Val Arg Lys Gly Gly Ala Asn Lys Arg Pro Ala  
485 490 495

ccc gat gac gcg gat aaa agc gag ccc aag cgg gcc tgc ccc tca gtc 1536  
Pro Asp Asp Ala Asp Lys Ser Glu Pro Lys Arg Ala Cys Pro Ser Val  
500 505 510

gcg gat cca tgc acg tca gac gcg gaa gga gct ccg gtg gac ttt gcc 1584  
Ala Asp Pro Ser Thr Ser Asp Ala Glu Gly Ala Pro Val Asp Phe Ala  
515 520 525

gac agg tat ggc tgc cga tgg tta tct tcc aga ttg gct cga gga caa 1632  
Asp Arg Tyr Gly Cys Arg Trp Leu Ser Ser Arg Leu Ala Arg Gly Gln  
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cct ctc tga 1641  
Pro Leu  
545

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20 25 30  
Lys Glu Trp Glu Leu Pro Pro Asp Ser Asp Met Asp Leu Asn Leu Ile  
35 40 45

Glu Gln Ala Pro Leu Thr Val Ala Glu Lys Leu Gln Arg Asp Phe Leu  
50 55 60

Val Gln Trp Arg Arg Val Ser Lys Ala Pro Glu Ala Leu Phe Phe Val  
65 70 75 80

Gln Phe Glu Lys Gly Glu Ser Tyr Phe His Leu His Ile Leu Val Glu  
85 90 95

Thr Thr Gly Val Lys Ser Met Val Leu Gly Arg Phe Leu Ser Gln Ile  
100 105 110

Arg Asp Lys Leu Val Gln Thr Ile Tyr Arg Gly Ile Glu Pro Thr Leu  
115 120 125

Pro Asn Trp Phe Ala Val Thr Lys Thr Arg Asn Gly Ala Gly Gly Gly  
130 135 140

Asn Lys Val Val Asp Glu Cys Tyr Ile Pro Asn Tyr Leu Leu Pro Lys  
145 150 155 160

Thr Gln Pro Glu Leu Gln Trp Ala Trp Thr Asn Met Glu Glu Tyr Ile  
165 170 175

Ser Ala Cys Leu Asn Leu Ala Glu Arg Lys Arg Leu Val Ala Gln His  
180 185 190

Leu Thr His Val Ser Gln Thr Gln Glu Gln Asn Lys Glu Asn Leu Asn  
195 200 205

Pro Asn Ser Asp Ala Pro Val Ile Arg Ser Lys Thr Ser Ala Arg Tyr  
210 215 220

Met Glu Leu Val Gly Trp Leu Val Asp Arg Gly Ile Thr Ser Glu Lys  
225 230 235 240

Gln Trp Ile Gln Glu Asp Gln Ala Ser Tyr Ile Ser Phe Asn Ala Ala  
245 250 255

Ser Asn Ser Arg Ser Gln Ile Lys Ala Ala Leu Asp Asn Ala Gly Lys  
260 265 270

Ile Met Ala Leu Thr Lys Ser Ala Pro Asp Tyr Leu Val Gly Pro Ala  
275 280 285

Pro Pro Ala Asp Ile Lys Thr Asn Arg Ile Tyr Arg Ile Leu Glu Leu  
290 295 300

Asn Gly Tyr Glu Pro Ala Tyr Ala Gly Ser Val Phe Leu Gly Trp Ala  
305 310 315 320

Gln Lys Arg Phe Gly Lys Arg Asn Thr Ile Trp Leu Phe Gly Pro Ala  
325 330 335

Thr Thr Gly Lys Thr Asn Ile Ala Glu Ala Ile Ala His Ala Val Pro  
340 345 350

Phe Tyr Gly Cys Val Asn Trp Thr Asn Glu Asn Phe Pro Phe Asn Asp  
355 360 365

Cys Val Asp Lys Met Val Ile Trp Trp Glu Glu Gly Lys Met Thr Ala  
 370 375 380  
 Lys Val Val Glu Ser Ala Lys Ala Ile Leu Gly Gly Ser Lys Val Arg  
 385 390 395 400  
 Val Asp Gln Lys Cys Lys Ser Ser Ala Gln Ile Asp Pro Thr Pro Val  
 405 410 415  
 Ile Val Thr Ser Asn Thr Asn Met Cys Ala Val Ile Asp Gly Asn Ser  
 420 425 430  
 Thr Thr Phe Glu His Gln Gln Pro Leu Gln Asp Arg Met Phe Lys Phe  
 435 440 445  
 Glu Leu Thr Arg Arg Leu Glu His Asp Phe Gly Lys Val Thr Lys Gln  
 450 455 460  
 Glu Val Lys Glu Phe Phe Arg Trp Ala Gln Asp His Val Thr Glu Val  
 465 470 475 480  
 Ala His Glu Phe Tyr Val Arg Lys Gly Gly Ala Asn Lys Arg Pro Ala  
 485 490 495  
 Pro Asp Asp Ala Asp Lys Ser Glu Pro Lys Arg Ala Cys Pro Ser Val  
 500 505 510  
 Ala Asp Pro Ser Thr Ser Asp Ala Glu Gly Ala Pro Val Asp Phe Ala  
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 Asp Arg Tyr Gly Cys Arg Trp Leu Ser Ser Arg Leu Ala Arg Gly Gln  
 530 535 540  
 Pro Leu  
 545

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 cag tgg atc cag gag gac cag gcc tcg tac atc tcc ttc aac gcc gct 96  
 Gln Trp Ile Gln Glu Asp Gln Ala Ser Tyr Ile Ser Phe Asn Ala Ala  
 20 25 30  
 tcc aac tcg cgg tcc cag atc aag gcc gct ctg gac aat gcc ggc aag 144  
 Ser Asn Ser Arg Ser Gln Ile Lys Ala Ala Leu Asp Asn Ala Gly Lys  
 35 40 45

atc atg gcg ctg acc aaa tcc gcg ccc gac tac ctg gta ggc ccc gct Ile Met Ala Leu Thr Lys Ser Ala Pro Asp Tyr Leu Val Gly Pro Ala 50 55 60	192
ccg ccc gcg gac att aaa acc aac cgc atc tac cgc atc ctg gag ctg Pro Pro Ala Asp Ile Lys Thr Asn Arg Ile Tyr Arg Ile Leu Glu Leu 65 70 75 80	240
aac ggc tac gaa cct gcc tac gcc ggc tcc gtc ttt ctc ggc tgg gcc Asn Gly Tyr Glu Pro Ala Tyr Ala Gly Ser Val Phe Leu Gly Trp Ala 85 90 95	288
cag aaa agg ttc ggg aag cgc aac acc atc tgg ctg ttt ggg ccg gcc Gln Lys Arg Phe Gly Lys Arg Asn Thr Ile Trp Leu Phe Gly Pro Ala 100 105 110	336
acc acg ggc aag acc aac atc gcg gaa gcc atc gcc cac gcc gtg ccc Thr Thr Gly Lys Thr Asn Ile Ala Glu Ala Ile Ala His Ala Val Pro 115 120 125	384
ttc tac ggc tgc gtc aac tgg acc aat gag aac ttt ccc ttc aat gat Phe Tyr Gly Cys Val Asn Trp Thr Asn Glu Asn Phe Pro Phe Asn Asp 130 135 140	432
tgc gtc gac aag atg gtg atc tgg tgg gag gag ggc aag atg acg gcc Cys Val Asp Lys Met Val Ile Trp Trp Glu Glu Gly Lys Met Thr Ala 145 150 155 160	480
aag gtc gtg gag tcc gcc aag gcc att ctc ggc ggc agc aag gtg cgc Lys Val Val Glu Ser Ala Lys Ala Ile Leu Gly Gly Ser Lys Val Arg 165 170 175	528
gtg gac caa aag tgc aag tcg tcc gcc cag atc gac ccc acc ccc gtg Val Asp Gln Lys Cys Lys Ser Ser Ala Gln Ile Asp Pro Thr Pro Val 180 185 190	576
atc gtc acc tcc aac acc aac atg tgc gcc gtg att gac ggg aac agc Ile Val Thr Ser Asn Thr Asn Met Cys Ala Val Ile Asp Gly Asn Ser 195 200 205	624
acc acc ttc gag cac cag cag ccg ttg cag gac cgg atg ttc aaa ttt Thr Thr Phe Glu His Gln Gln Pro Leu Gln Asp Arg Met Phe Lys Phe 210 215 220	672
gaa ctc acc cgc cgt ctg gag cat gac ttt ggc aag gtg aca aag cag Glu Leu Thr Arg Arg Leu Glu His Asp Phe Gly Lys Val Thr Lys Gln 225 230 235 240	720
gaa gtc aaa gag ttc ttc cgc tgg gcg cag gat cac gtg acc gag gtg Glu Val Lys Glu Phe Phe Arg Trp Ala Gln Asp His Val Thr Glu Val 245 250 255	768
gcg cat gag ttc tac gtc aga aag ggt gga gcc aac aaa aga ccc gcc Ala His Glu Phe Tyr Val Arg Lys Gly Gly Ala Asn Lys Arg Pro Ala 260 265 270	816
ccc gat gac gcg gat aaa agc gag ccc aag cgg gcc tgc ccc tca gtc Pro Asp Asp Ala Asp Lys Ser Glu Pro Lys Arg Ala Cys Pro Ser Val 275 280 285	864



gcg gat cca tcg acg tca gac gcg gaa gga gct ccg gtg gac ttt gcc 912  
 Ala Asp Pro Ser Thr Ser Asp Ala Glu Gly Ala Pro Val Asp Phe Ala  
 290 295 300

gac agg tac caa aac aaa tgt tct cgt cac gcg ggc atg ctt cag atg 960  
 Asp Arg Tyr Gln Asn Lys Cys Ser Arg His Ala Gly Met Leu Gln Met  
 305 310 315 320

ctg ttt ccc tgc aag aca tgc gag aga atg aat cag aat ttc aac att 1008  
 Leu Phe Pro Cys Lys Thr Cys Glu Arg Met Asn Gln Asn Phe Asn Ile  
 325 330 335

tgc ttc acg cac ggg acg aga gac tgt tca gag tgc ttc ccc ggc gtg 1056  
 Cys Phe Thr His Gly Thr Arg Asp Cys Ser Glu Cys Phe Pro Gly Val  
 340 345 350

tca gaa tct caa ccg gtc gtc aga aag agg acg tat cgg aaa ctc tgt 1104  
 Ser Glu Ser Gln Pro Val Val Arg Lys Arg Thr Tyr Arg Lys Leu Cys  
 355 360 365

gcc att cat cat ctg ctg ggg cgg gct ccc gag att gct tgc tcg gcc 1152  
 Ala Ile His His Leu Leu Gly Arg Ala Pro Glu Ile Ala Cys Ser Ala  
 370 375 380

tgc gat ctg gtc aac gtg gac ctg gat gac tgt gtt tct gag caa taa 1200  
 Cys Asp Leu Val Asn Val Asp Leu Asp Asp Cys Val Ser Glu Gln  
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Gln Trp Ile Gln Glu Asp Gln Ala Ser Tyr Ile Ser Phe Asn Ala Ala  
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Ser Asn Ser Arg Ser Gln Ile Lys Ala Ala Leu Asp Asn Ala Gly Lys  
 35 40 45

Ile Met Ala Leu Thr Lys Ser Ala Pro Asp Tyr Leu Val Gly Pro Ala  
 50 55 60

Pro Pro Ala Asp Ile Lys Thr Asn Arg Ile Tyr Arg Ile Leu Glu Leu  
 65 70 75 80

Asn Gly Tyr Glu Pro Ala Tyr Ala Gly Ser Val Phe Leu Gly Trp Ala  
 85 90 95

Gln Lys Arg Phe Gly Lys Arg Asn Thr Ile Trp Leu Phe Gly Pro Ala  
 100 105 110

Thr Thr Gly Lys Thr Asn Ile Ala Glu Ala Ile Ala His Ala Val Pro  
 115 120 125

Phe Tyr Gly Cys Val Asn Trp Thr Asn Glu Asn Phe Pro Phe Asn Asp

130	135	140
Cys Val Asp Lys Met Val	Ile Trp Trp Glu Glu Gly Lys Met Thr Ala	145 150 155 160
Lys Val Val Glu Ser Ala Lys Ala Ile Leu Gly Gly Ser Lys Val Arg		165 170 175
Val Asp Gln Lys Cys Lys Ser Ser Ala Gln Ile Asp Pro Thr Pro Val		180 185 190
Ile Val Thr Ser Asn Thr Asn Met Cys Ala Val Ile Asp Gly Asn Ser		195 200 205
Thr Thr Phe Glu His Gln Gln Pro Leu Gln Asp Arg Met Phe Lys Phe		210 215 220
Glu Leu Thr Arg Arg Leu Glu His Asp Phe Gly Lys Val Thr Lys Gln		225 230 235 240
Glu Val Lys Glu Phe Phe Arg Trp Ala Gln Asp His Val Thr Glu Val		245 250 255
Ala His Glu Phe Tyr Val Arg Lys Gly Gly Ala Asn Lys Arg Pro Ala		260 265 270
Pro Asp Asp Ala Asp Lys Ser Glu Pro Lys Arg Ala Cys Pro Ser Val		275 280 285
Ala Asp Pro Ser Thr Ser Asp Ala Glu Gly Ala Pro Val Asp Phe Ala		290 295 300
Asp Arg Tyr Gln Asn Lys Cys Ser Arg His Ala Gly Met Leu Gln Met		305 310 315 320
Leu Phe Pro Cys Lys Thr Cys Glu Arg Met Asn Gln Asn Phe Asn Ile		325 330 335
Cys Phe Thr His Gly Thr Arg Asp Cys Ser Glu Cys Phe Pro Gly Val		340 345 350
Ser Glu Ser Gln Pro Val Val Arg Lys Arg Thr Tyr Arg Lys Leu Cys		355 360 365
Ala Ile His His Leu Leu Gly Arg Ala Pro Glu Ile Ala Cys Ser Ala		370 375 380
Cys Asp Leu Val Asn Val Asp Leu Asp Asp Cys Val Ser Glu Gln		385 390 395

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Met	Glu	Leu	Val	Gly	Trp	Leu	Val	Asp	Arg	Gly	Ile	Thr	Ser	Glu	Lys	
1				5					10					15		
cag	tgg	atc	cag	gag	gac	cag	gcc	tcg	tac	atc	tcc	ttc	aac	gcc	gct	96
Gln	Trp	Ile	Gln	Glu	Asp	Gln	Ala	Ser	Tyr	Ile	Ser	Phe	Asn	Ala	Ala	
			20					25					30			
tcc	aac	tcg	cgg	tcc	cag	atc	aag	gcc	gct	ctg	gac	aat	gcc	ggc	aag	144
Ser	Asn	Ser	Arg	Ser	Gln	Ile	Lys	Ala	Ala	Leu	Asp	Asn	Ala	Gly	Lys	
		35					40					45				
atc	atg	gcg	ctg	acc	aaa	tcc	gcg	ccc	gac	tac	ctg	gta	ggc	ccc	gct	192
Ile	Met	Ala	Leu	Thr	Lys	Ser	Ala	Pro	Asp	Tyr	Leu	Val	Gly	Pro	Ala	
	50					55					60					
ccg	ccc	gcg	gac	att	aaa	acc	aac	cgc	atc	tac	cgc	atc	ctg	gag	ctg	240
Pro	Pro	Ala	Asp	Ile	Lys	Thr	Asn	Arg	Ile	Tyr	Arg	Ile	Leu	Glu	Leu	
65					70					75					80	
aac	ggc	tac	gaa	cct	gcc	tac	gcc	ggc	tcc	gtc	ttt	ctc	ggc	tgg	gcc	288
Asn	Gly	Tyr	Glu	Pro	Ala	Tyr	Ala	Gly	Ser	Val	Phe	Leu	Gly	Trp	Ala	
				85					90					95		
cag	aaa	agg	ttc	ggg	aag	cgc	aac	acc	atc	tgg	ctg	ttt	ggg	ccg	gcc	336
Gln	Lys	Arg	Phe	Gly	Lys	Arg	Asn	Thr	Ile	Trp	Leu	Phe	Gly	Pro	Ala	
			100					105					110			
acc	acg	ggc	aag	acc	aac	atc	gcg	gaa	gcc	atc	gcc	cac	gcc	gtg	ccc	384
Thr	Thr	Gly	Lys	Thr	Asn	Ile	Ala	Glu	Ala	Ile	Ala	His	Ala	Val	Pro	
		115					120					125				
ttc	tac	ggc	tgc	gtc	aac	tgg	acc	aat	gag	aac	ttt	ccc	ttc	aat	gat	432
Phe	Tyr	Gly	Cys	Val	Asn	Trp	Thr	Asn	Glu	Asn	Phe	Pro	Phe	Asn	Asp	
	130					135					140					
tgc	gtc	gac	aag	atg	gtg	atc	tgg	tgg	gag	gag	ggc	aag	atg	acg	gcc	480
Cys	Val	Asp	Lys	Met	Val	Ile	Trp	Trp	Glu	Glu	Gly	Lys	Met	Thr	Ala	
145					150					155					160	
aag	gtc	gtg	gag	tcc	gcc	aag	gcc	att	ctc	ggc	ggc	agc	aag	gtg	cgc	528
Lys	Val	Val	Glu	Ser	Ala	Lys	Ala	Ile	Leu	Gly	Gly	Ser	Lys	Val	Arg	
				165					170					175		
gtg	gac	caa	aag	tgc	aag	tcg	tcc	gcc	cag	atc	gac	ccc	acc	ccc	gtg	576
Val	Asp	Gln	Lys	Cys	Lys	Ser	Ser	Ala	Gln	Ile	Asp	Pro	Thr	Pro	Val	
			180					185					190			
atc	gtc	acc	tcc	aac	acc	aac	atg	tgc	gcc	gtg	att	gac	ggg	aac	agc	624
Ile	Val	Thr	Ser	Asn	Thr	Asn	Met	Cys	Ala	Val	Ile	Asp	Gly	Asn	Ser	
		195					200					205				
acc	acc	ttc	gag	cac	cag	cag	ccg	ttg	cag	gac	cgg	atg	ttc			

Thr	Thr	Phe	Glu	His	Gln	Gln	Pro	Leu	Gln	Asp	Arg	Met	Phe	Lys	Phe		
210						215					220						
gaa	ctc	acc	cgc	cgt	ctg	gag	cat	gac	ttt	ggc	aag	gtg	aca	aag	cag		720
Glu	Leu	Thr	Arg	Arg	Leu	Glu	His	Asp	Phe	Gly	Lys	Val	Thr	Lys	Gln		
225					230					235					240		
gaa	gtc	aaa	gag	ttc	ttc	cgc	tgg	gcg	cag	gat	cac	gtg	acc	gag	gtg		768
Glu	Val	Lys	Glu	Phe	Phe	Arg	Trp	Ala	Gln	Asp	His	Val	Thr	Glu	Val		
				245					250					255			
gcg	cat	gag	ttc	tac	gtc	aga	aag	ggt	gga	gcc	aac	aaa	aga	ccc	gcc		816
Ala	His	Glu	Phe	Tyr	Val	Arg	Lys	Gly	Gly	Ala	Asn	Lys	Arg	Pro	Ala		
			260					265					270				
ccc	gat	gac	gcg	gat	aaa	agc	gag	ccc	aag	cgg	gcc	tgc	ccc	tca	gtc		864
Pro	Asp	Asp	Ala	Asp	Lys	Ser	Glu	Pro	Lys	Arg	Ala	Cys	Pro	Ser	Val		
		275					280					285					
gcg	gat	cca	tcg	acg	tca	gac	gcg	gaa	gga	gct	ccg	gtg	gac	ttt	gcc		912
Ala	Asp	Pro	Ser	Thr	Ser	Asp	Ala	Glu	Gly	Ala	Pro	Val	Asp	Phe	Ala		
	290					295					300						
gac	agg	tat	ggc	tgc	cga	tgg	tta	tct	tcc	aga	ttg	gct	cga	gga	caa		960
Asp	Arg	Tyr	Gly	Cys	Arg	Trp	Leu	Ser	Ser	Arg	Leu	Ala	Arg	Gly	Gln		
305					310					315					320		
cct	ctc	tga															969
Pro	Leu																

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 <223> minor splice site

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 Ser Asn Ser Arg Ser Gln Ile Lys Ala Ala Leu Asp Asn Ala Gly Lys  
 35 40 45  
 Ile Met Ala Leu Thr Lys Ser Ala Pro Asp Tyr Leu Val Gly Pro Ala  
 50 55 60  
 Pro Pro Ala Asp Ile Lys Thr Asn Arg Ile Tyr Arg Ile Leu Glu Leu  
 65 70 75 80  
 Asn Gly Tyr Glu Pro Ala Tyr Ala Gly Ser Val Phe Leu Gly Trp Ala  
 85 90 95

Gln Lys Arg Phe Gly Lys Arg Asn Thr Ile Trp Leu Phe Gly Pro Ala  
 100 105 110  
 Thr Thr Gly Lys Thr Asn Ile Ala Glu Ala Ile Ala His Ala Val Pro  
 115 120 125  
 Phe Tyr Gly Cys Val Asn Trp Thr Asn Glu Asn Phe Pro Phe Asn Asp  
 130 135 140  
 Cys Val Asp Lys Met Val Ile Trp Trp Glu Glu Gly Lys Met Thr Ala  
 145 150 155 160  
 Lys Val Val Glu Ser Ala Lys Ala Ile Leu Gly Gly Ser Lys Val Arg  
 165 170 175  
 Val Asp Gln Lys Cys Lys Ser Ser Ala Gln Ile Asp Pro Thr Pro Val  
 180 185 190  
 Ile Val Thr Ser Asn Thr Asn Met Cys Ala Val Ile Asp Gly Asn Ser  
 195 200 205  
 Thr Thr Phe Glu His Gln Gln Pro Leu Gln Asp Arg Met Phe Lys Phe  
 210 215 220  
 Glu Leu Thr Arg Arg Leu Glu His Asp Phe Gly Lys Val Thr Lys Gln  
 225 230 235 240  
 Glu Val Lys Glu Phe Phe Arg Trp Ala Gln Asp His Val Thr Glu Val  
 245 250 255  
 Ala His Glu Phe Tyr Val Arg Lys Gly Gly Ala Asn Lys Arg Pro Ala  
 260 265 270  
 Pro Asp Asp Ala Asp Lys Ser Glu Pro Lys Arg Ala Cys Pro Ser Val  
 275 280 285  
 Ala Asp Pro Ser Thr Ser Asp Ala Glu Gly Ala Pro Val Asp Phe Ala  
 290 295 300  
 Asp Arg Tyr Gly Cys Arg Trp Leu Ser Ser Arg Leu Ala Arg Gly Gln  
 305 310 315 320  
 Pro Leu

<210> 12  
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gag	ggc	att	cgc	gag	tgg	tgg	gac	ttg	aaa	cct	gga	gcc	ccg	aag	ccc		96
Glu	Gly	Ile	Arg	Glu	Trp	Trp	Asp	Leu	Lys	Pro	Gly	Ala	Pro	Lys	Pro		
			20					25					30				
aaa	gcc	aac	cag	caa	aag	cag	gac	gac	ggc	cgg	ggt	ctg	gtg	ctt	cct		144
Lys	Ala	Asn	Gln	Gln	Lys	Gln	Asp	Asp	Gly	Arg	Gly	Leu	Val	Leu	Pro		
		35					40					45					
ggc	tac	aag	tac	ctc	gga	ccc	ttc	aac	gga	ctc	gac	aag	ggg	gag	ccc		192
Gly	Tyr	Lys	Tyr	Leu	Gly	Pro	Phe	Asn	Gly	Leu	Asp	Lys	Gly	Glu	Pro		
	50					55					60						
gtc	aac	gcg	gcg	gac	gca	gcg	gcc	ctc	gag	cac	gac	aag	gcc	tac	gac		240
Val	Asn	Ala	Ala	Asp	Ala	Ala	Ala	Leu	Glu	His	Asp	Lys	Ala	Tyr	Asp		
65					70					75					80		
cag	cag	ctc	aaa	gcg	ggt	gac	aat	ccg	tac	ctg	cgg	tat	aac	cac	gcc		288
Gln	Gln	Leu	Lys	Ala	Gly	Asp	Asn	Pro	Tyr	Leu	Arg	Tyr	Asn	His	Ala		
				85					90					95			
gac	gcc	gag	ttt	cag	gag	cgt	ctg	caa	gaa	gat	acg	tct	ttt	ggg	ggc		336
Asp	Ala	Glu	Phe	Gln	Glu	Arg	Leu	Gln	Glu	Asp	Thr	Ser	Phe	Gly	Gly		
			100					105					110				
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Asn	Leu	Gly	Arg	Ala	Val	Phe	Gln	Ala	Lys	Lys	Arg	Val	Leu	Glu	Pro		
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Leu	Gly	Leu	Val	Glu	Glu	Gly	Ala	Lys	Thr	Ala	Pro	Gly	Lys	Lys	Arg		
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Lys	Thr	Gly	Gln	Gln	Pro	Ala	Lys	Lys	Arg	Leu	Asn	Phe	Gly	Gln	Thr		
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ggc	gac	tca	gag	tca	gtc	ccc	gat	cca	caa	cct	ctc	gga	gaa	cct	cca		576
Gly	Asp	Ser	Glu	Ser	Val	Pro	Asp	Pro	Gln	Pro	Leu	Gly	Glu	Pro	Pro		
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Ala	Pro	Met	Ala	Asp	Asn	Asn	Glu	Gly	Ala	Asp	Gly	Val	Gly	Asn	Ala		
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acc	acc	agc	acc	cgc	acc	tgg	gcc	ttg	ccc	acc	tac	aat	aac	cac	ctc		768
Thr	Thr	Ser	Thr	Arg	Thr	Trp	Ala	Leu	Pro	Thr	Tyr	Asn	Asn	His	Leu		

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Tyr	Lys	Gln	Ile	Ser	Ser	Ala	Ser	Thr	Gly	Ala	Ser	Asn	Asp	Asn	His	
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Tyr	Phe	Gly	Tyr	Ser	Thr	Pro	Trp	Gly	Tyr	Phe	Asp	Phe	Asn	Arg	Phe	
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Trp	Gly	Phe	Arg	Pro	Lys	Arg	Leu	Asn	Phe	Lys	Leu	Phe	Asn	Ile	Gln	
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Leu	Thr	Ser	Thr	Val	Gln	Val	Phe	Ser	Asp	Ser	Glu	Tyr	Gln	Leu	Pro	
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tac	gtc	ctc	ggc	tct	gcg	cac	cag	ggc	tgc	ctc	cct	ccg	ttc	ccg	gcg	1104
Tyr	Val	Leu	Gly	Ser	Ala	His	Gln	Gly	Cys	Leu	Pro	Pro	Phe	Pro	Ala	
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Asp	Val	Phe	Met	Ile	Pro	Gln	Tyr	Gly	Tyr	Leu	Thr	Leu	Asn	Asn	Gly	
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gag	gaa	gtg	cct	ttc	cac	agc	agc	tac	gcg	cac	agc	cag	agc	ctg	gac	1296
Glu	Glu	Val	Pro	Phe	His	Ser	Ser	Tyr	Ala	His	Ser	Gln	Ser	Leu	Asp	
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cgg	ctg	atg	aat	cct	ctc	atc	gac	caa	tac	ctg	tat	tac	ctg	aac	aga	1344
Arg	Leu	Met	Asn	Pro	Leu	Ile	Asp	Gln	Tyr	Leu	Tyr	Tyr	Leu	Asn	Arg	
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Thr	Gln	Asn	Gln	Ser	Gly	Ser	Ala	Gln	Asn	Lys	Asp	Leu	Leu	Phe	Ser	
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Gly Tyr Lys Tyr Leu Gly Pro Phe Asn Gly Leu Asp Lys Gly Glu Pro  
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Val Asn Ala Ala Asp Ala Ala Ala Leu Glu His Asp Lys Ala Tyr Asp  
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Asp Ala Glu Phe Gln Glu Arg Leu Gln Glu Asp Thr Ser Phe Gly Gly  
 100 105 110

Asn Leu Gly Arg Ala Val Phe Gln Ala Lys Lys Arg Val Leu Glu Pro  
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Leu Gly Leu Val Glu Glu Gly Ala Lys Thr Ala Pro Gly Lys Lys Arg  
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Pro Val Glu Gln Ser Pro Gln Glu Pro Asp Ser Ser Ser Gly Ile Gly  
 145 150 155 160

Lys Thr Gly Gln Gln Pro Ala Lys Lys Arg Leu Asn Phe Gly Gln Thr  
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Gly Asp Ser Glu Ser Val Pro Asp Pro Gln Pro Leu Gly Glu Pro Pro  
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Ala Thr Pro Ala Ala Val Gly Pro Thr Thr Met Ala Ser Gly Gly Gly  
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Ala Pro Met Ala Asp Asn Asn Glu Gly Ala Asp Gly Val Gly Asn Ala  
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Ser Gly Asn Trp His Cys Asp Ser Thr Trp Leu Gly Asp Arg Val Ile  
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Thr Thr Ser Thr Arg Thr Trp Ala Leu Pro Thr Tyr Asn Asn His Leu  
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Tyr Lys Gln Ile Ser Ser Ala Ser Thr Gly Ala Ser Asn Asp Asn His

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Gly	Pro	Cys	Tyr	Arg	Gln	Gln	Arg	Val	Ser	Lys	Thr	Lys	Thr	Asp	Asn		
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Asn	Asn	Ser	Asn	Phe	Thr	Trp	Thr	Gly	Ala	Ser	Lys	Tyr	Asn	Leu	Asn		
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Lys	Glu	Ser	Ala	Gly	Ala	Ser	Asn	Thr	Ala	Leu	Asp	Asn	Val	Met	Ile		
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Thr	Asp	Glu	Glu	Glu	Ile	Lys	Ala	Thr	Asn	Pro	Val	Ala	Thr	Glu	Arg		
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Phe	Gly	Thr	Val	Ala	Val	Asn	Phe	Gln	Ser	Ser	Ser	Thr	Asp	Pro	Ala		

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Asp	Arg	Asp	Val	Tyr	Leu	Gln	Gly	Pro	Ile	Trp	Ala	Lys	Ile	Pro	His					
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Thr	Asp	Gly	His	Phe	His	Pro	Ser	Pro	Leu	Met	Gly	Gly	Phe	Gly	Leu					
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Lys	Asn	Pro	Pro	Pro	Gln	Ile	Leu	Ile	Lys	Asn	Thr	Pro	Val	Pro	Ala					
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Gln	Tyr	Ser	Thr	Gly	Gln	Val	Ser	Val	Glu	Ile	Glu	Trp	Glu	Leu	Gln					
		675					680					685								
Lys	Glu	Asn	Ser	Lys	Arg	Trp	Asn	Pro	Glu	Val	Gln	Tyr	Thr	Ser	Asn					
	690					695					700									
Tyr	Ala	Lys	Ser	Ala	Asn	Val	Asp	Phe	Thr	Val	Asp	Asn	Asn	Gly	Leu					
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Arg	Leu	Asn	Phe	Gly	Gln	Thr	Gly	Asp	Ser	Glu	Ser	Val	Pro	Asp	Pro	
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caa cct ctc gga gaa cct cca gca acc ccc gct gct gtg gga cct act																192
Gln	Pro	Leu	Gly	Glu	Pro	Pro	Ala	Thr	Pro	Ala	Ala	Val	Gly	Pro	Thr	
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gcc gac gga gtg ggt aat gcc tca gga aat tgg cat tgc gat tcc aca	288
Ala Asp Gly Val Gly Asn Ala Ser Gly Asn Trp His Cys Asp Ser Thr	
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tgg ctg ggc gac aga gtc atc acc acc agc acc cgc acc tgg gcc ttg	336
Trp Leu Gly Asp Arg Val Ile Thr Thr Ser Thr Arg Thr Trp Ala Leu	
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Pro Thr Tyr Asn Asn His Leu Tyr Lys Gln Ile Ser Ser Ala Ser Thr	
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Gly Ala Ser Asn Asp Asn His Tyr Phe Gly Tyr Ser Thr Pro Trp Gly	
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Tyr Phe Asp Phe Asn Arg Phe His Cys His Phe Ser Pro Arg Asp Trp	
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Cys Leu Pro Pro Phe Pro Ala Asp Val Phe Met Ile Pro Gln Tyr Gly	
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Ile Trp Ala Lys Ile Pro His Thr Asp Gly His Phe His Pro Ser Pro	
485 490 495	
ctt atg ggc ggc ttt gga ctc aag aac ccg cct cct cag atc ctc atc	1536
Leu Met Gly Gly Phe Gly Leu Lys Asn Pro Pro Pro Gln Ile Leu Ile	
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Lys Asn Thr Pro Val Pro Ala Asn Pro Pro Ala Glu Phe Ser Ala Thr	
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Thr Met Ala Ser Gly Gly Gly Ala Pro Met Ala Asp Asn Asn Glu Gly  
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Trp Leu Gly Asp Arg Val Ile Thr Thr Ser Thr Arg Thr Trp Ala Leu  
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Pro Thr Tyr Asn Asn His Leu Tyr Lys Gln Ile Ser Ser Ala Ser Thr  
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Gly Ala Ser Asn Asp Asn His Tyr Phe Gly Tyr Ser Thr Pro Trp Gly  
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Tyr Phe Asp Phe Asn Arg Phe His Cys His Phe Ser Pro Arg Asp Trp  
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Gln Arg Leu Ile Asn Asn Asn Trp Gly Phe Arg Pro Lys Arg Leu Asn  
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Phe Lys Leu Phe Asn Ile Gln Val Lys Glu Val Thr Thr Asn Asp Gly  
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Val Thr Thr Ile Ala Asn Asn Leu Thr Ser Thr Val Gln Val Phe Ser  
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Gln	Pro	Lys	Asn 340	Trp	Leu	Pro	Gly	Pro 345	Cys	Tyr	Arg	Gln	Gln	Arg	Val 350
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Ser	Gly	Val	Met	Ile 405	Phe	Gly	Lys	Glu	Ser 410	Ala	Gly	Ala	Ser	Asn	Thr 415
Ala	Leu	Asp	Asn 420	Val	Met	Ile	Thr	Asp 425	Glu	Glu	Glu	Ile	Lys	Ala	Thr 430
Asn	Pro	Val 435	Ala	Thr	Glu	Arg	Phe 440	Gly	Thr	Val	Ala	Val 445	Asn	Phe	Gln
Ser 450	Ser	Ser	Thr	Asp	Pro	Ala 455	Thr	Gly	Asp	Val	His 460	Ala	Met	Gly	Ala
Leu 465	Pro	Gly	Met	Val	Trp 470	Gln	Asp	Arg	Asp	Val 475	Tyr	Leu	Gln	Gly	Pro 480
Ile	Trp	Ala	Lys	Ile 485	Pro	His	Thr	Asp	Gly 490	His	Phe	His	Pro	Ser	Pro 495
Leu	Met	Gly	Gly 500	Phe	Gly	Leu	Lys	Asn 505	Pro	Pro	Pro	Gln	Ile 510	Leu	Ile
Lys	Asn	Thr 515	Pro	Val	Pro	Ala	Asn 520	Pro	Pro	Ala	Glu	Phe 525	Ser	Ala	Thr
Lys	Phe	Ala	Ser	Phe	Ile	Thr	Gln	Tyr	Ser	Thr	Gly	Gln	Val	Ser	Val

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Glu Ile Glu Trp Glu Leu Gln Lys Glu Asn Ser Lys Arg Trp Asn Pro  
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Glu Val Gln Tyr Thr Ser Asn Tyr Ala Lys Ser Ala Asn Val Asp Phe  
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gac gga gtg ggt aat gcc tca gga aat tgg cat tgc gat tcc aca tgg 96  
Asp Gly Val Gly Asn Ala Ser Gly Asn Trp His Cys Asp Ser Thr Trp  
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ctg ggc gac aga gtc atc acc acc agc acc cgc acc tgg gcc ttg ccc 144  
Leu Gly Asp Arg Val Ile Thr Thr Ser Thr Arg Thr Trp Ala Leu Pro  
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acc tac aat aac cac ctc tac aag caa atc tcc agt gct tca acg ggg 192  
Thr Tyr Asn Asn His Leu Tyr Lys Gln Ile Ser Ser Ala Ser Thr Gly  
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gcc agc aac gac aac cac tac ttc ggc tac agc acc ccc tgg ggg tat 240  
Ala Ser Asn Asp Asn His Tyr Phe Gly Tyr Ser Thr Pro Trp Gly Tyr  
65                                      70                                      75                                      80

ttt gat ttc aac aga ttc cac tgc cac ttt tca cca cgt gac tgg cag 288  
Phe Asp Phe Asn Arg Phe His Cys His Phe Ser Pro Arg Asp Trp Gln  
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cga ctc atc aac aac aat tgg gga ttc cgg ccc aag aga ctc aac ttc 336  
Arg Leu Ile Asn Asn Asn Trp Gly Phe Arg Pro Lys Arg Leu Asn Phe  
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aaa ctc ttc aac atc caa gtc aag gag gtc acg acg aat gat ggc gtc 384  
Lys Leu Phe Asn Ile Gln Val Lys Glu Val Thr Thr Asn Asp Gly Val  
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aca acc atc gct aat aac ctt acc agc acg gtt caa gtc ttc tcg gac 432  
Thr Thr Ile Ala Asn Asn Leu Thr Ser Thr Val Gln Val Phe Ser Asp

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Pro Gly Met Val Trp Gln Asp Arg Asp Val Tyr Leu Gln Gly Pro Ile			
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tgg gcc aaa att cct cac aca gat gga cac ttt cac ccg tct cct ctt			1296
Trp Ala Lys Ile Pro His Thr Asp Gly His Phe His Pro Ser Pro Leu			
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Met Gly Gly Phe Gly Leu Lys Asn Pro Pro Pro Gln Ile Leu Ile Lys			
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Asn Thr Pro Val Pro Ala Asn Pro Pro Ala Glu Phe Ser Ala Thr Lys			
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Phe Ala Ser Phe Ile Thr Gln Tyr Ser Thr Gly Gln Val Ser Val Glu			
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Val Gln Tyr Thr Ser Asn Tyr Ala Lys Ser Ala Asn Val Asp Phe Thr			
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Val Asp Asn Asn Gly Leu Tyr Thr Glu Pro Arg Pro Ile Gly Thr Arg			
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 Thr Tyr Asn Asn His Leu Tyr Lys Gln Ile Ser Ser Ala Ser Thr Gly  
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Ala	Ser	Asn	Asp	Asn	His	Tyr	Phe	Gly	Tyr	Ser	Thr	Pro	Trp	Gly	Tyr	65	70	75	80
Phe	Asp	Phe	Asn	Arg	Phe	His	Cys	His	Phe	Ser	Pro	Arg	Asp	Trp	Gln		85	90	95
Arg	Leu	Ile	Asn	Asn	Asn	Trp	Gly	Phe	Arg	Pro	Lys	Arg	Leu	Asn	Phe		100	105	110
Lys	Leu	Phe	Asn	Ile	Gln	Val	Lys	Glu	Val	Thr	Thr	Asn	Asp	Gly	Val		115	120	125
Thr	Thr	Ile	Ala	Asn	Asn	Leu	Thr	Ser	Thr	Val	Gln	Val	Phe	Ser	Asp		130	135	140
Ser	Glu	Tyr	Gln	Leu	Pro	Tyr	Val	Leu	Gly	Ser	Ala	His	Gln	Gly	Cys		145	150	155
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Cys	Leu	Glu	Tyr	Phe	Pro	Ser	Gln	Met	Leu	Arg	Thr	Gly	Asn	Asn	Phe		195	200	205
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His	Ser	Gln	Ser	Leu	Asp	Arg	Leu	Met	Asn	Pro	Leu	Ile	Asp	Gln	Tyr		225	230	235
Leu	Tyr	Tyr	Leu	Asn	Arg	Thr	Gln	Asn	Gln	Ser	Gly	Ser	Ala	Gln	Asn		245	250	255
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Leu	Asp	Asn	Val	Met	Ile	Thr	Asp	Glu	Glu	Glu	Ile	Lys	Ala	Thr	Asn		355	360	365
Pro	Val	Ala	Thr	Glu	Arg	Phe	Gly	Thr	Val	Ala	Val	Asn	Phe	Gln	Ser		370	375	380

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Pro Gly Met Val Trp Gln Asp Arg Asp Val Tyr Leu Gln Gly Pro Ile  
 405 410 415

Trp Ala Lys Ile Pro His Thr Asp Gly His Phe His Pro Ser Pro Leu  
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Met Gly Gly Phe Gly Leu Lys Asn Pro Pro Pro Gln Ile Leu Ile Lys  
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Asn Thr Pro Val Pro Ala Asn Pro Pro Ala Glu Phe Ser Ala Thr Lys  
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Val Gln Tyr Thr Ser Asn Tyr Ala Lys Ser Ala Asn Val Asp Phe Thr  
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